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The diagram illustrates a 3rd-order sigma-delta modulator architecture. It features three input channels: Pilot, Fundamental, and Subfundamental. Each channel's signal is processed through a specific signal point mapping and channel gain block before being summed. The summed signals are then multiplied by a long code (PN1, PN2) to produce the final output. The architecture includes various gain blocks and a 1/2-chip delay block to manage the timing and scaling of the signals.

A set of individually gain adjusted subscriber channels (402, 404, 411, 415) are formed via the use of a set of orthogonal subchannel codes (Wc, Ws, Wf) having a small number of PN spreading chips per orthogonal waveform period. Data to be transmitted via one of the transmit channels is low code rate error correction encoded and sequence repeated before being modulated with one of the subchannel codes, gain adjusted, and summed with data modulated using the other subchannel codes. The resulting summed data (410, 420) is modulated using a user long code and a pseudorandom spreading code (PN code) and upconverted for transmission. The use of the short orthogonal codes provides interference suppression while still allowing extensive error correction coding and repetition for time diversity to overcome the Rayleigh fading commonly experienced in terrestrial wireless systems. The set of sub-channel codes may comprise four Walsh codes, each orthogonal to the remaining codes of the set. The use of four sub-channels is preferred as it allows shorter orthogonal codes to be used, however, the use of a greater number of channels and therefore longer codes is acceptable. Preferably, pilot data is transmitted via a first one of the transmit channels and power control data transmitted via a second transmit channel. The length, or number of chips, in each channel code may be different to further reduce the peak-to-average transmit power for higher rate data transmission.

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# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/US 98/09868

**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 6 H04B1/707 H04L1/00

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 H04B H04L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>WO 95 03652 A (QUALCOMM INC) 2 February 1995 see abstract see page 8, line 32 - page 9, line 15 see page 9, line 33-39 see page 11, line 14-26 see page 12, line 16-39 see page 16, line 33 - page 17, line 28 ----- -/--</p>	1-15

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Int lional Application No  
PCT/US 98/09868

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 103 459 A (GILHOUSEN KLEIN S ET AL) 7 April 1992 cited in the application see abstract see column 5, line 63 - column 6, line 50 see column 11, line 35-56 see column 18, line 44 - column 19, line 10 see claims 1,2,4,12,21,22 see figures 4A,,4B,,4C ----	1-15
A	US 5 329 547 A (LING FUYUN) 12 July 1994 see abstract see column 7, line 5-49 see claims 1-3,26 see figure 1 ----	1-15
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P,X	WO 97 45970 A (QUALCOMM INC) 4 December 1997 see the whole document ----	1-15
P,X	WO 97 47098 A (QUALCOMM INC) 11 December 1997 see the whole document -----	1-15

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